What's Cropping Up?

A NEWSLETTER FOR NEW YORK FIELD CROPS & SOILS VOLUME 2, NUMBER 3, 1992

Alfalfa Snout Beetle: A Threat to the New York Dairy Industry

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Department of Entomology

The alfalfa snout beetle, Otiorhynchus ligustici, is a serious threat to the profitability of New York's dairy industry. Alfalfa snout beetle is the only alfalfa insect pest in North America which can completely destroy alfalfa stands within 1-2 years and stand loss is frequently blamed on winter kill rather than insect damage. The adult beetles feed on the alfalfa leaves and the grubs (larvae) feed on the alfalfa roots. Fortunately for most of New York's dairy industry, the alfalfa snout beetle infested area is currently limited to 8 counties in northern and central New York and southern Ontario, Canada. However, this insect has more than doubled its range since the early 1970's. Currently, approximately 13% of New York's agricultural land is permanently infested with this insect. The known infested area includes all of Jefferson and Oswego counties and portions of Cayuga, Clinton, Essex, Lewis, St. Lawrence, and Wayne counties.

Cost to the Dairy Industry

The presence of alfalfa snout beetle on a dairy farm in significant numbers has a very measurable impact on farm profitability. These impacts are measured in increased costs of alfalfa production, decrease milk production from poor quality forage and/or higher costs from increased "off-farm" purchases of high quality feed. Snout beetle impact on farm profitability has been conservatively estimated to cause a 20-30% increase in feed costs in order to maintain pre-snout beetle milk production levels.

Insect Biology

The alfalfa snout beetle has a 2-year life cycle, most of which is underground. This behavior makes detection difficult and damage develops unrecognized if a grower is unaware of an infestation in a field. All adults are female and a single beetle accidentally introduced into a noninfested area is capable of starting a new infestation. Snout beetle adults emerge early in the spring (mid-April to early May), feed on the new shoots growing from alfalfa crowns and migrate to lay their eggs. Adult beetles lay their eggs close to alfalfa crowns and the eggs hatch within a few days. The tiny, white, legless grubs feed on the main and side roots of the host plant and mature into full grown grubs (about 1/2 inch) by late summer. These mature grubs burrow deep into the soil for the winter, remain deep in the soil for the next 1.5 years and emerge as adults during the second spring to complete the 2-year lifecycle. Both even and odd year populations are present within some of the NY infested areas.

New infestations are detected by the presence of migrating adult beetles during the early spring and/or the presence of dead areas within alfalfa stands. Dead areas are easily spotted in the early spring but are quickly filled in with grass and weeds. Alfalfa plants killed by this insect are frequently heaved out of the ground during the winter and area lying on the soil surface within these dead areas. During the late summer, infested plants often yellow during late August, die and turn brown during September. Digging 10-12 inches deep within these areas will usually uncover grubs, pupae or adults if they are present.

Spread of Alfalfa Snout Beetle

The natural spread of the flightless alfalfa snout beetle is slow since this insect disperses by walking or floating in water. Natural spread by walking is limited to 103 miles per year and current water dispersal is not expanding the infested range due to the topography of the infested area. However, the southern edge of the infestation is now within a short distance of the state barge canal and when migrating alfalfa snout beetle adults reach and canal system, water dispersal via the canal system is expected to play an increasing important role in the natural dispersal of this serious insect pest. The most significant spread of this insect has been a result of commerce. Evidence strongly suggests that the original introduction of this insect into North America (Oswego, NY) was aboard sailing ballast from Europe during the mid-1800's. Evidence also suggest that subsequent spread has been greatly enhanced

(See ALFALFA, page 4)

PEST MANAGEMENT

IPM, Increasing the Benefits from Checking Fields

J. Keith Waldron
IPM Coordinator, Dairy and Field Crops

Farmers can use Integrated Pest Management (IPM) techniques to help improve their competitive edge against pests. Consider using an IPM approach as you are checking crops. Walking fields regularly, once a week if possible, increases opportunities for using a least toxic and environmentally sound approach to managing common insects, diseases and weed pests. Following recommended scouting procedures and an investment of a few minutes per field can really pay off by enabling you to:

- Evaluate how effective previous pest control actions have been.
- Detect pests early and regularly monitor them to determine the need for control actions.
- Identify opportunities for improving future pest control efforts.

The Field Visit

Make the most of your visit by collecting information that is typical of the overall field condition. Avoid sampling field borders since they may have quite different problems than the majority of the field. Walk in a "W" or zig-zag shaped pattern to cover more of the field. Use a different entry, route, and exit with each visit to increase the chances of finding isolated problems such as weeds and diseases. Be sure to also check areas where plants are noticeably different from the others. Keep a record of the important findings, including a field map to locate significant problems.

Proper identification of problems is the foundation for developing effective management strategies. Determine the *real* cause of field problems. Were they pest related or caused by other factors such as weather, planter problems, nutrient deficiencies? Correctly identify the problem, determine if it is serious, and if it should be a priority for continued monitoring. If you find an unfamiliar problem affecting a large number of plants, collect samples for identification. Determine if the problem is common across the entire field or found only in specific areas. Are there any obvious patterns associated with the problem, such as drainage?

While memories of early season cropping operations are still fresh, it is a good idea to check fields for crop development and to evaluate how effective pest management activities have been. Some common early season items to check:

Corn

What is the actual corn population? Are emergence problems such as seed corn maggot or seedling diseases evident? Has the weed control program been effective? Are there any important weed escapes; triazine resistant annual broadleaf weeds?

Alfalfa

Are there any signs of winter kill or alfalfa weevil feeding? Are there large areas of weeds or diseased plants within the field? Do these conditions suggest other management problems or opportunities? While harvesting alfalfa look for any obvious problems that might reduce yield or quality. Note approximate locations of problem areas and check them later. What is the crown count per square foot? How can this information help improve future management decisions?

Scouting information helps protect crops from avoidable losses, identifies field needing priority attention, and helps improve the timeliness of other crop cropping activities.

For many pests, early detection of economically important pest levels leads to control options being employed this season. For example, early cutting will effectively reduce crop losses, if alfalfa weevil feeding exceeds 40% foliar damage and the crop is within 7 - 10 days of harvest. Early detection of weevil problems can help prioritize field harvest schedules.

Keeping records of field visits also help optimize future management decisions. Selection and use of disease resistant varieties or hybrids based on identified disease problems helps minimize crop losses from these pests. Similarly, individual field corn rootworm beetle counts this season provides valuable information for next season's corn rotation and soil insecticide use decisions.

(see IPM, page 4)

Weed Seeds in New York Dairy Manure

PEST MANAGEMENT

Jane Mt. Pleasant and Ken Schlather
Department of Soil, Crop and Atmopsheric Sciences

Application of animal manure to farmland is often seen as both beneficial and injurious. On the positive side, we know that nutrients contained in manure can be used for crop growth, reducing the need for inorganic fertilizers. Manure application also contributes large quantities of organic matter to the soil and this can have very beneficial effects on soil physical properties. On the negative side, the introduction and spread of weed seeds on dairy farms is frequently attributed to manure application. For example, velvetleaf is often assumed to have spread within and between farms in New York through manure application.

There is considerable research documenting that many weed seeds pass through the digestive tracts of cows unharmed, and that weed seeds maintain their viability after extended storage periods in manure piles. But there is very little information on the actual numbers of weed seed in manure on dairy farms. Two questions are of particular interest to farmers:

1) How many and which weed seed species are commonly found in NY dairy manure?

2) Does manure application increase weed problems in cultivated fields?

Manure from 26 farms in NY was sampled to determine the number and species of weed seed present. The farms included a range of manure handling and feeding systems. Additionally, six of the farms were identified as having large velvetleaf populations in their cornfields.

Viable weed seeds were found in almost all the manure samples, but the number of seeds varied widely, ranging from none to almost one million seeds per ton of manure. Overall, farms averaged 160,000 weed seeds per ton of manure. Sixty-one species (18 grasses and 43 broadleaf plants) were identified, but most species appeared very infrequently and often with only one seed in a sample. However, a number of species which are important weeds in NY corn appeared in large numbers on many farms (see figure, p. 4). Common lambsquarter was by far the most prevalent species, occurring on 17 out of 26 farms with an average of more than 140,000 seeds per ton. Surprisingly, velvetleaf appeared in just one manure sample and the number of seeds in the sample was low.

Using results from this survey, a typical manure application (20 T/A) would add about 380 weeds per square yard in the field. While this number seems high, when compared to the number of seeds normally present in the soil of cultivated fields, these added weed seeds may be insignificant. Soil seedbanks in corn fields are reported to have densities ranging from 2380 to more than 35,000 seeds per square yard. Consider also that a single lambsquarter plant can produce 130,000 seeds in one growing season.

Does this mean that manure is not an important source of weed seed introduction? The answer may depend on whether feed is grown on the farm or purchased elsewhere. On farms growing most of their own feed, manure with high numbers of weed seeds is most likely applied to fields with high seed bank numbers. The manure is infested with weed seed because weed control on the farm is inadequate. Large weed populations in the field mean many weed seeds in the feed and subsequently in the manure. The effect of additional seeds in manure applied to fields with high seedbank numbers would not be significant. If weed control was excellent on the farm, weed seed numbers in feed, manure and the soil seedbank would all be low. Again, manure application would have little impact on weed levels.

Conversely, on farms that buy a large portion of their feed, the situation can be considerably different. For example, on a farm with excellent weed control, soil seedbank numbers would be low. Purchasing weed-infested feed would result in manure with high numbers of weed seeds, applied to fields with low seedbank numbers. Manure application in this situation could represent a significant source of weed introduction.

(See WEED SEEDS, page 4)

PEST MANAGEMENT

ALFALFA, from page 1

with the movement of soil and gravel, farm equipment, bee hives and freshly baled 1st cutting hay.

Avoiding Alfalfa Snout Beetle Spread onto your Area

Spread of alfalfa snout beetle around the state can be minimized by following these guidelines. 1) Farm equipment should be free of soil, crop residue and insects before being transported out of the infested areas. 2) Gravel and sand should not be transported out of the infested area during the periods of adult beetle activity (late-April through June). Soil should never be transported out of the infested area. 3) Bee hives should not be transported out of the infested area during periods of adult beetle activity (late-April through June). 4) 1st cutting hay purchased from the infested area should be stored at least 6 weeks before being transported out of the infested area. Second and third cutting hay pose no risk to the spread of this insect.

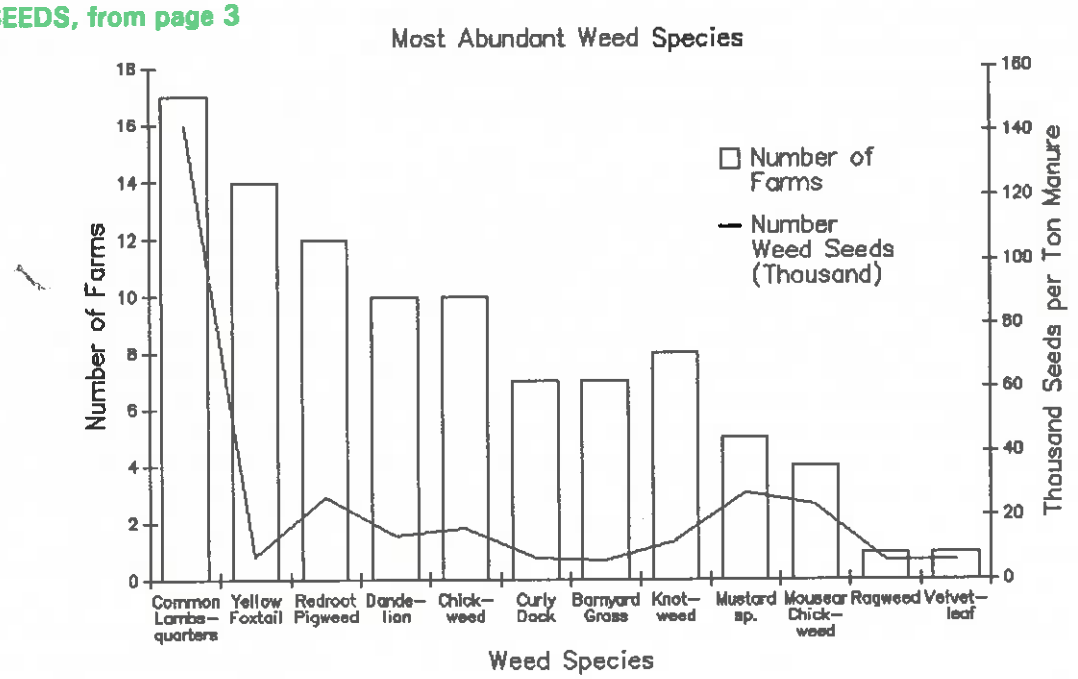
IPM, from page 2

Current IPM information is available in the Cornell Recommendations for Integrated Field Crop Management. Additional information is available in "Growing Alfalfa the IPM Way," a grower guide to the recommended IPM scouting procedures and decision making techniques for alfalfa pests in New York; and the video "Scouting for Common Alfalfa Diseases in New York."

Field visits can yield more than relaxing exercise and peace of mind. Whether you collect the information yourself, or obtain it from a IMP service provider, field scouting can lead to increased profits and more knowledgeable, environmentally sound pest control decisions.

IPM methods are easy to use and can positively impact crop profitability and environmental protection. To learn more about IPM contact your local Cornell Cooperative Extension office or the author at Cornell University, 5130 Comstock Hall, Ithaca, NY 14853. The publications mentioned are available through the Cornell Distribution Center, 7 Research Park, Ithaca, NY 14850.

WEED SEEDS, from page 3



Spring Harvest Management of Perennial Grasses

PEST MANAGEMENT

Jerry Cherney
Department of Soil, Crop and Atmospheric Sciences

The Northeast supports a large dairy industry, although much of the land is not suitable for alfalfa production. Even in areas where alfalfa can be sown, much of the alfalfa is sown with a grass. Grasses have some advantages over alfalfa when nutrient management and manure disposal become primary concerns.

Perennial grasses typically are not considered a high-quality dairy feed, particularly when the forage comes from the spring harvest. Some perennial grass species are considered higher quality forage than others. We studied several grasses at three locations in 1991 to evaluate trends in forage quality.

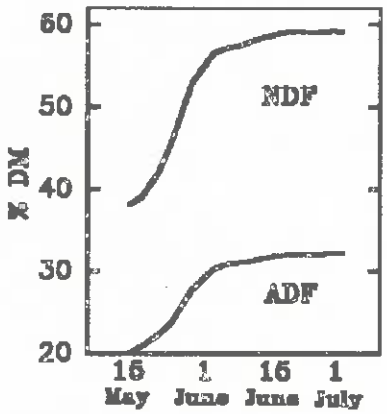
Grass Studies

Venture reed canarygrass, Common timothy, Fawn tall fescue, Regar meadow bromegrass, Garrison creeping foxtail, and Manhattan perennial ryegrass were sampled from established stands. Samples were taken for quality analysis every three to five days from the initiation of spring growth until the first week of July. Sites were located at Canton, Chazy, and Valatie in New York State. Samples were analyzed for neutral detergent fiber (NDF), acid detergent fiber (ADF), in vitro rate of digestion, and nitrogen content.

Results

A low-alkaloid reed canarygrass variety and a low-endophyte tall fescue variety were used in this study. High-alkaloid or high-endophyte types are extremely unpalatable, and would be unacceptable as potential dairy feed. Although species matured morphologically at different times, fiber composition was very similar across species within locations. As expected, large differences across sampling dates were observed for forage quality analyses. The NDF concentration increased from 45 to 55% in one week. Crude protein declined at an equally rapid rate.

Rate of fiber digestion is considered an important quality component and is influenced by the composition and structure of the fiber. Rate of fiber digestion consistently declined across harvest dates, with over a 50% decline in digestion rate from mid-May to mid-June. Fiber digestion rate followed a pattern similar to other forage quality parameters.



A forage NDF concentration of approximately 45% is considered optimal for a diet with a grass as the single forage source. A forage NDF concentration of 55% is considered a maximum value for properly balancing a diet with a single forage source. This gives a farmer about a one week harvest window in the spring for high quality grass forage. The exact dates each spring for the harvest window will vary from year to year plus or minus a week, but the forage quality pattern will be consistent from year to year.

Reed canarygrass forage quality was as high as any other grass species studied. Reed canarygrass is often established on sites with poor drainage, because it will persist under wet conditions, as well as being drought resistant. Under these conditions it may be very difficult to harvest during the window of opportunity for high quality forage.

Recommendations

Farmers in New York State tend to favor timothy among the perennial grasses, although individual farmers will argue the forage quality merits of their favorite grass. A grass species should be selected for its ability to persist under a given set of soil and climatic conditions. The speed of quality decline with increased maturity is much more important than quality differences between individual grass species. Consider harvesting pure stands of grass in the spring before harvesting alfalfa, in order to produce acceptable dairy forage quality.

SOIL FERTILITY

Fertilize Alfalfa According to Soil Test

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Background

Alfalfa is an important forage crop for New York's dairy industry, but few think of it as a dual purpose crop. Not only is alfalfa an excellent source of feed, but it is also a valuable green manure crop because it contains protein nitrogen that is released as available nitrogen to a following crop such as corn. Because of its importance, it pays to take good care of alfalfa.

An important part of managing alfalfa is to ensure an adequate supply of plant nutrients. Good soil fertility management means having the right amount of nutrients available when the plant needs it in order to maximize fertilizer efficiency, productivity, and profit. Alfalfa has a high nutrient demand and the soil may or may not be able to supply a sufficient amount of nutrients for optimum economic yield. The best way to determine fertilizer requirements is to soil test on a regular basis. Soil testing is essential because residual levels of nutrients in the soil must be taken in account to prevent under or over fertilization.

Research

The recommendations from a soil testing laboratory should be backed up with a research program to ensure that you are getting the best available information for your soil and climatic region. The Cornell soil test lab runs several fertilizer trials each year to make sure that the recommendations are on target.

The data in the Table shows the results of a recent alfalfa experiment. Its purpose was to determine the economical rate of phosphorus (P) and potassium (K) fertilizer for a moderately well drained soil with a medium P soil test (4 lb/a) and a low K soil test (65 lb/a). The P and K soil test levels were lower than normally found on dairy farms because manure was not applied to this field for over 20 years. We were also interested in determining the yield response to boron (B) at a medium soil test level (0.54 lb/a) and to sulphur (S). The density of the alfalfa stand, or the number of crowns per square foot, was also measured to see if the rate of fertilizer had an affect on stand persistence.

The P,K, and S were topdressed annually in the spring at the rates listed in the Table. Boron is shown as the annual rate resulting from a one time application of 5 pounds of B per acre during the 1988 establishment year. Yields are reported as the total tons of hay produced in 3 years for a 3 cut system based on a 42 to 45 day cutting interval. Fertilizer costs were calculated on the annual price of P,K,B,and S and summed over 3 years. The fertilizer rate, listed from 1 to 13, are shown in the Table along with the yield, fertilizer cost, and plant population.

The rate of fertilizer had a large influence on yield. The lowest yield of 11.6 tons per acre resulted from not applying any fertilizer at all except B (rate 1), and re-enforces the need for fertilizer when soil nutrients are in short supply. Hay yields increased from 12.6 to 14.3 tons as the rate of P increased (rates 2-4), and from 11.9 to 14.3 tons as the K rate increased (rates 5-8). The cost of fertilizer P and K increased accordingly. More about fertilizer economics in a moment. An application of B increased production by 0.6 tons at a relatively low cost (rates 9,10). Although S is essential for synthesizing several proteins, applying S (rates 11,12) did not improve yield. Our past research has shown that adding fertilizer S did not increase yield or protein content because there was a sufficient amount of S available in the soil from organic matter, by-product S in fertilizer, and rainfall.

The soil test recommendation is represented by the last fertilizer treatment (rate 13). The recommendation was adjusted annually based on the results of the previous fall soil sampling. The P_2O_5 recommendation did not change over the three years, and the K_2O recommendation ranged from 65 pounds in 1989 to 110 pounds per acre in 1991 (average of 90). One pound of B was recommended every 2 to 3 years and S was not recommended. The soil test recommendation was 1.3 tons lower than the maximum yield, but this should come as no surprise because the soil test recommendation is designed for maximum economic

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RESIDUES

SOIL TEST, from page 6

yield and not maximum yield. Fertilizer cost ranged from $205-$257 for maximum yield verses $66 for the maximum economic yield. The soil test recommendation was the best combination of yield and fertilizer cost.

The last column in the Table shows the alfalfa stand count, measured after the first cut in the third year. The lowest count of 10 crowns per square foot occurred where fertilizer was not applied. There was no particular trend in plant population for the remaining fertilizer rates. In all cases, the stand was more than adequate.

Conclusions

Soil test on a regular basis. It can save money by preventing lost yield and excessive fertilizer purchases. It is often difficult to predict changes in soil test levels from year to year for a heavy feeder like alfalfa. Therefore, for intensive alfalfa production and additional accuracy in the recommendation, sample low to medium testing fields every year, every 2 years for fields testing in the high range, and at least once every 3 years for fields testing very high.

Total alfalfa production, fertilizer cost, and stand density for 3 years, 1989-91.

	Fertilizer applied, lbs/a/yr			Yield	Fertilizer	Stand count
	N-P_2O_5-K_2O	B	S	tons/ac	$/ac	crowns/ft²
	Check					
1.	0-0-0	1.3	0	11.6	11	10
	P-response					
2.	0-0-240	1.3	0	12.6	114	15
3.	0-40-240	1.3	0	13.2	144	13
4.	0-120-240	1.3	0	14.3	205	11
	K-response					
5.	0-120-0	1.3	0	11.9	102	13
6.	0-120-60	1.3	0	12.3	128	12
7.	0-120-120	1.3	0	13.2	154	11
8.	0-120-360	1.3	0	14.3	257	13
	B-response					
9.	0-120-240	0	0	13.7	194	14
10.	0-120-240	1.3	0	14.3	205	13
	S-response					
11.	0-120-240	1.3	0	14.3	205	11
12.	0-120-240	1.3	50	14.3	242	13
	soil test recommendation					
13.	0-30-90	0.5	0	13.0	66	13
			LSD	*1.1*		*3*

AURORA FIELD DAY - July 10

Please plan on joining us at the Robert B. Musgrave Research Farm for the Aurora Field Day on July 10. Some of the research plots that will be featured include:

- *Pre-Sidedress Soil Test for Nitrogen*-Stu Klausner and Shaw Reid
- *Timing of Tillage Operations*-Harold van Es
- *Field Crop Weed Control*-Russ Hahn
- *Forage Quality*-Jerry Cherney
- *Sustainable Agricultural Systems*-Jane Mt. Pleasant
- *Cultivator Demonstration for Corn Weed Control*-Bob Burt/Jim Fritch
- *Soybean Variety Testing*-Madison Wright
- *New Oat Varieties*-Bill Pardee
- *Seed Treatment of Small Grains*-Gary Bergstrom
- *Corn Breeding and Hybrid Testing*-Magaret Smith
- *Corn Plant Populations*-Bill Cox
- *NYS Agricultural Weather Program*-Dave Masonis

Please reserve July 10 on your calendar and look for more information in the coming weeks.

Calendar of Events

June 3	Small Grain Field Day, Musgrave Research Farm, Aurora, NY.
June 28-July 1	Northeast Agronomy Meetings, Univ. of Connecticut, Storrs, Connecticut.
July 8	Cornell Seed Growers Field Day, Ithaca, NY.
July 8	Weed Science Field Day, Valatie, NY.
July 10	Aurora Field Day, Musgrave Research Farm, Aurora, NY.
July 15	Weed Science Field Day, Musgrave Research Farm, Aurora, NY.
July 16	Weed Science Field Day, Ithaca/Freeville, NY.
July 16	Empire State Soil Fertility, Association Summer Meeting.
August 8-12	American Phytopatholical Society Meetings, Portland, Or.

What's Cropping Up? is a bimonthly newsletter distributed by the Department of Soil, Crop and Atmospheric Sciences at Cornell University. The purpose of the newsletter is to provide timely information on field crop production and environmental issues as it relates to New York agriculture. Articles are regularly contributed by the following Departments at Cornell University: Soil, Crop and Atmospheric Sciences, Plant Breeding, Plant Pathology, and Entomology. **To subscribe for 1992 send a check for $8.00 along with the form at the right.**

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